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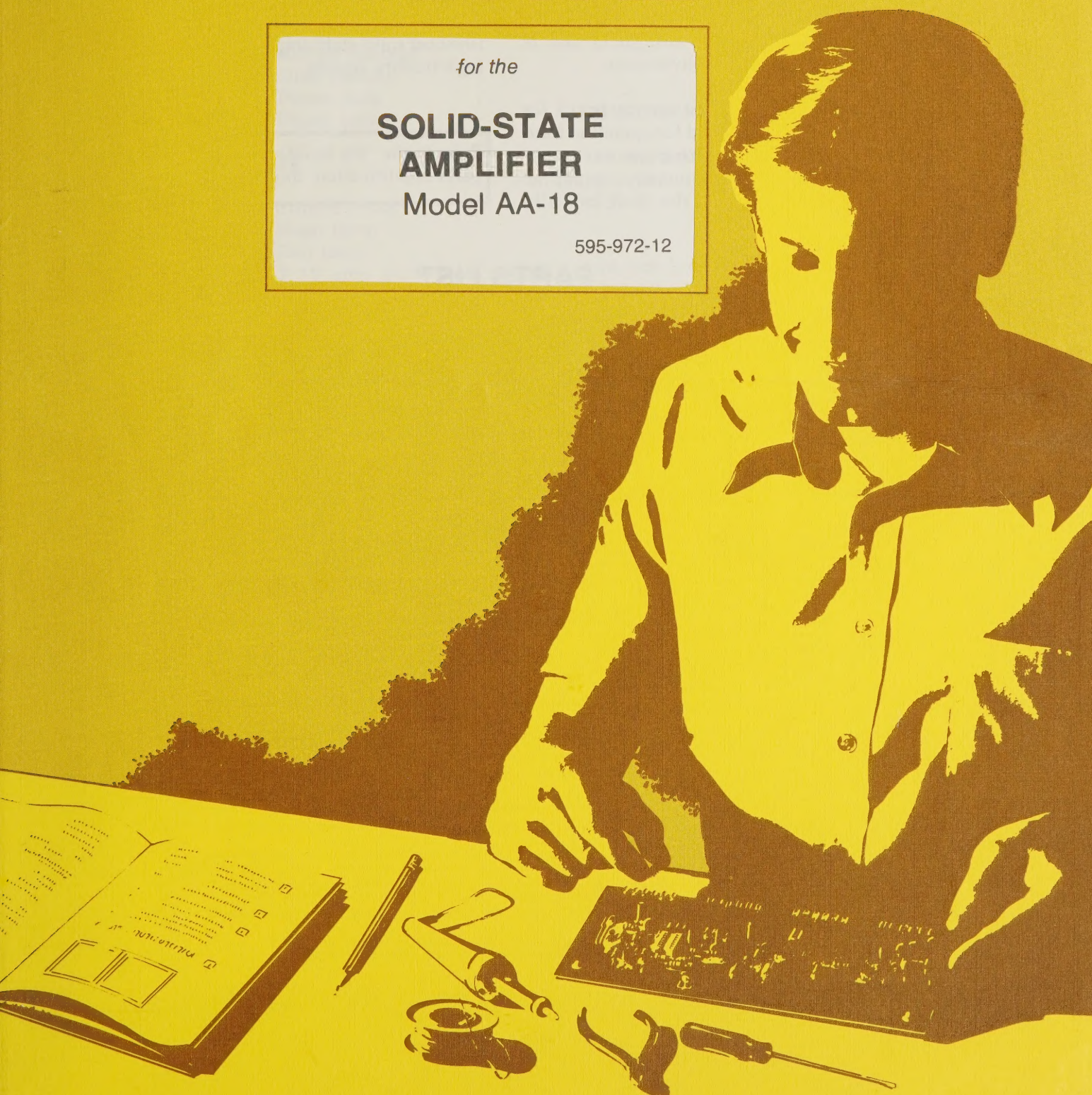
HEATHKIT MANUAL

for the

SOLID-STATE AMPLIFIER

Model AA-18

595-972-12



HEATH COMPANY • BENTON HARBOR, MICHIGAN

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information (616) 982-3411
Credit (616) 982-3561
Replacement Parts (616) 982-3571

Technical Assistance Phone Numbers

8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only

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YOUR HEATHKIT 90-DAY LIMITED WARRANTY

Consumer Protection Plan for Heathkit Consumer Products

Welcome to the Heath family. We believe you will enjoy assembling your kit and will be pleased with its performance. Please read this Consumer Protection Plan carefully. It is a "LIMITED WARRANTY" as defined in the U.S. Consumer Product Warranty and Federal Trade Commission Improvement Act. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Heath's Responsibility

PARTS — Replacements for factory defective parts will be supplied free for 90 days from date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you . . . anywhere in the world.

SERVICE LABOR — For a period of 90 days from the date of purchase, any malfunction caused by defective parts or error in design will be corrected at no charge to you. You must deliver the unit at your expense to the Heath factory, any Heathkit Electronic Center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

TECHNICAL CONSULTATION — You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

NOT COVERED — The correction of assembly errors, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Use of corrosive solder and/or the unauthorized modification of the product or of any furnished component will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, customer assembly, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORSEEABLE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

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EFFECTIVE WARRANTY DATE — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service or parts.

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SHIPPING UNITS — Follow the packing instructions published in the assembly manuals. Damage due to inadequate packing cannot be repaired under warranty.

If you are not satisfied with our service (warranty or otherwise) or our products, write directly to our Director of Customer Service, Heath Company, Benton Harbor MI 49022. He will make certain your problems receive immediate, personal attention.

Heathkit® Manual

for the

SOLID-STATE AMPLIFIER Model AA-18

595-972-12



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HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

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INTRODUCTION

The Heathkit Model AA-18 Solid-State Amplifier is designed for use with ceramic phono cartridges, monophonic AM or FM tuners, or any signal source with a "flat" output of sufficient amplitude. The reliable solid-state curcuitry of the single channel amplifier delivers a full four watts of music power to the output speaker terminals. A headphone jack is located on the front panel for convenience.

The amplifier features a printed circuit board for easier assembly, and can be wired for operation from 120 VAC or 240 VAC. The output transistors are connected in a complementary-symmetry, emitter-follower circuit that eliminates the need for bulky

transformers. This results in improved frequency response, and a more compact and trim cabinet.

The styling and color scheme of the rugged metal cabinet blends with most room decor. All of these features combine to provide you with an attractive, low-cost solid-state amplifier that is ideal for a small high fidelity system.

Refer to the "Kit Builders Guide" for information on parts identification, tools, wiring, and soldering.

PARTS LIST

The numbers in parentheses in the Parts List are keyed to the numbers on the Parts Pictorial (fold-out from Page 3).

To order a replacement part, always include the PART NUMBER. Use the Parts Order Form furnished

with the kit.

If one is not available, see "Replacement Parts" inside the rear cover of this Manual. Your Warranty is located inside the front cover. For prices, refer to the separate "Heath Parts Price List."

| PART No. | PARTS Per Kit | DESCRIPTION |
|-------------|------------------|-------------|
|-------------|------------------|-------------|

RESISTORS

1/2 Watt

| | | |
|-----------|---|---------------------------------------|
| (1) 6-100 | ✓ | 10 Ω (brown-black-black) |
| 6-330 | ✓ | 33 Ω (orange-orange-black) |
| 6-470 | ✓ | 47 Ω (yellow-violet-black) |
| 6-101 | ✓ | 100 Ω (brown-black-brown) |
| 6-391 | ✓ | 390 Ω (orange-white-brown) |
| 6-222 | ✓ | 2200 Ω (red-red-red) |
| 6-103 | ✓ | 10 k Ω (brown-black-orange) |
| 6-223 | ✓ | 22 k Ω (red-red-orange) |
| 6-393 | ✓ | 39 k Ω (orange-white-orange) |
| 6-823 | ✓ | 82 k Ω (gray-red-orange) |
| 6-104 | ✓ | 100 k Ω (brown-black-yellow) |
| 6-224 | ✓ | 220 k Ω (red-red-yellow) |
| 6-274 | ✓ | 270 k Ω (red-violet-yellow) |
| 6-474 | 1 | 470 k Ω (yellow-violet-yellow) |

| PART No. | PARTS Per Kit | DESCRIPTION |
|-------------|------------------|-------------|
|-------------|------------------|-------------|

Other Resistors

| | | |
|-----------|---|--|
| 6-331-1 | ✓ | 330 Ω (orange-orange-brown) 1 watt |
| (2) 3-6-2 | ✓ | .51 Ω 5% (green-brown-silver-gold) 2 watt |

NOTE: This resistor is a 2 watt wire-wound resistor, but is the same size as the 1 watt composition resistor.

CAPACITORS

Disc

| | | |
|-----------|---|-------------|
| (3) 21-21 | ✓ | 200 pF |
| 21-48 | ✓ | .05 μ F |

Mylar*

| | | |
|-----------|---|--------------|
| (4) 27-57 | ✓ | .018 μ F |
|-----------|---|--------------|

*DuPont Registered Trademark.

| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

Electrolytic

| | | |
|------------|---|--------------|
| (5) 25-864 | 2 | 10 μ F |
| (6) 25-951 | 1 | 1000 μ F |
| (7) 25-878 | 1 | 2200 μ F |

CONTROLS-SWITCH-JACKS

| | | |
|-------------|---|------------------------|
| (8) 10-238 | 1 | 100 k Ω control |
| 10-236 | 1 | 500 k Ω control |
| (9) 60-1 | 1 | Slide switch |
| (10) 436-27 | 1 | Phone jack |
| (11) 434-42 | 1 | Phono jack |

DIODES-LAMP-FUSE

| | | |
|-------------|---|---------------------------------|
| (12) 57-27 | 2 | Silicon diode |
| (13) 412-15 | 1 | Neon lamp |
| (14) 413-10 | 1 | Red lens |
| (15) 421-40 | 1 | 3/16 amp slow-blow pigtail fuse |

TRANSISTORS

NOTE: When identifying each transistor, look for the part number or type number printed on the transistor case. EXAMPLE: Transistor number 417-116 may be marked 417-116, 2N3638, or 417-116/2N3638 (or in this last case, where 417-116 is also on the transistor, another number may be used in place of 2N3638).

| | | |
|--------------|---|-------------------|
| (16) 417-116 | 1 | 2N3638 transistor |
| (17) 417-118 | 2 | 2N3393 transistor |
| (18) 417-145 | 1 | MJE371 transistor |
| 417-144 | 1 | MJE521 transistor |
| (19) 254-22 | 2 | #4 torque washer |

INSULATORS-TERMINAL STRIPS-RUBBER FEET

| | | |
|------------|---|---|
| (20) 75-24 | 1 | Line cord strain relief |
| (21) 75-95 | 2 | Mica insulator (packed between two pieces of cardboard) |
| (22) 431-5 | 1 | 4-lug terminal strip |
| (23) 431-6 | 1 | 2-lug screw type terminal strip |
| (24) 261-4 | 4 | Rubber foot |

| PART No. | PARTS Per Kit | DESCRIPTION |
|----------|---------------|-------------|
|----------|---------------|-------------|

WIRE-CABLE-SLEEVING

| | | |
|--------|---|--------------------|
| 344-50 | 1 | Black hookup wire |
| 344-54 | 1 | Yellow hookup wire |
| 343-15 | 1 | Shielded cable |
| 346-29 | 1 | Sleeving, clear |
| 346-4 | 1 | Sleeving, black |
| 89-49 | 1 | Line cord |

HARDWARE

#4 Hardware

| | | |
|--------------|---|--------------------|
| (25) 250-213 | 2 | 4-40 x 5/16" screw |
| (26) 252-2 | 2 | 4-40 nut |

#6 Hardware

| | | |
|--------------|----|-----------------------------|
| (27) 250-89 | 8 | 6-32 x 3/8" screw |
| (28) 250-26 | 4 | 6-32 x 5/8" screw |
| (29) 250-155 | 6 | #6 x 3/8" sheet metal screw |
| (30) 255-13 | 4 | #6 x 1/4" spacer |
| (31) 254-1 | 11 | #6 lockwasher |
| (32) 252-3 | 10 | 6-32 nut |

Other Hardware

| | | |
|-------------|---|----------------------|
| (33) 254-4 | 1 | Control lockwasher |
| (34) 253-10 | 1 | Control flat washer |
| (35) 252-7 | 1 | Control nut |
| (36) 250-43 | 2 | 8-32 x 1/4" setscrew |

GENERAL

| | | |
|--------------|---|---|
| (37) 252-32 | 1 | Push-on speednut |
| (38) 455-13 | 1 | Silicone grease |
| (39) 462-187 | 2 | Knob |
| 54-201 | 1 | Power transformer |
| 85-229-3 | 1 | Circuit board |
| 90-1202-1 | 1 | Chassis |
| 90-388-1 | 1 | Chassis cover |
| 205-1709-1 | 1 | Chassis bottom plate |
| 490-5 | 1 | Nut starter |
| 391-34 | 1 | Blue and white label |
| 597-308 | 1 | Kit Builders Guide |
| 597-260 | 1 | Parts Order Form |
| | 1 | Manual (See front cover for part number.) |
| | | Solder |

STEP-BY-STEP-ASSEMBLY

Before you start to assemble this kit, read the Kit Builders Guide for information on wiring, soldering, resistors, and capacitors.

CIRCUIT BOARD ASSEMBLY

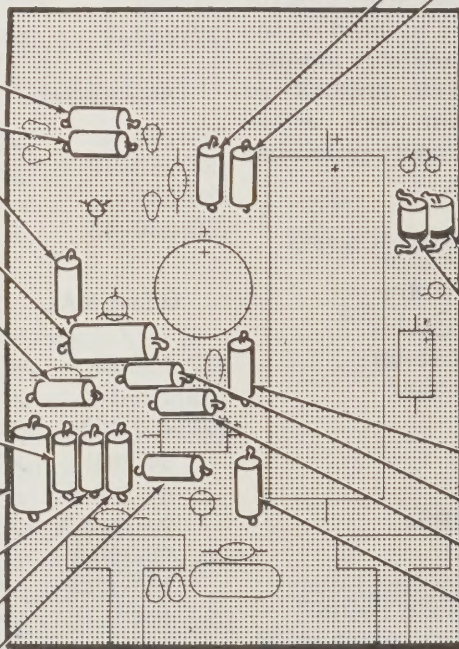
Install components on the circuit board by following the steps on Pictorials 1 and 2.

NOTE: Use 1/2 watt resistors unless the step directs otherwise. Resistors will be called out by their resistance value (in Ω or $k\Omega$) and color code. Capacitors will be called out by the capacitance value and type.

START

NOTE: Position the circuit board with the lettered side up as shown, and complete the the following steps.

- () 100 Ω (brown-black-brown).
- () 100 Ω (brown-black-brown).
- () 33 Ω (orange-orange-black).
- () 330 Ω 1 watt (orange-orange-brown).
- () 390 Ω (orange-white-brown).
- () Solder all leads to the foil and cut off the excess lead lengths.
- () 47 Ω (yellow-violet-black).
- () .51 Ω 2 watt (green-brown-silver).
- () 39 $k\Omega$ (orange-white-orange)
- () 470 $k\Omega$ (yellow-violet-yellow).
- () 220 $k\Omega$ (red-red-yellow).
- () Solder all leads to the foil and cut off the excess lead lengths.



PICTORIAL 1

CONTINUE

- () 10 Ω (brown-black-black).

- () 22 $k\Omega$ (red-red-orange).

NOTE: When installing silicon diodes, be sure to position the cathode end as shown. The cathode end will be marked with a color dot, color band, or color end.

COLOR
END

COLOR
DOT

COLOR
BAND

- () Silicon diode (#57-27).

- () Silicon diode (#57-27).

- () Solder all leads to the foil and cut off the excess lead lengths.

- () 10 $k\Omega$ (brown-black-orange).

- () 270 $k\Omega$ (red-violet-yellow).

- () 100 $k\Omega$ (brown-black-yellow).

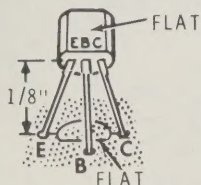
- () 2200 Ω (red-red-red).

- () Solder all leads to the foil and cut off the excess lead lengths.

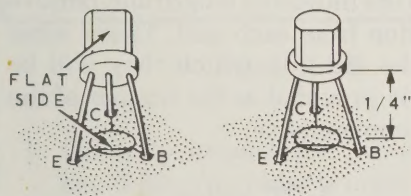
NOTE: The remaining 82 $k\Omega$ (gray-red-orange) resistor will be used later.

START

- () Install the 2N3638 transistor (#417-116) at Q3 in the following manner as shown: First identify the E, B, and C transistor leads. Then insert the leads into their correct holes, which are indicated by E, B, and C on the circuit board. Position the transistor 1/8" away from the circuit board. Solder each lead to the foil and cut off the excess lead lengths.



NOTE: When installing the remaining transistors, be sure the leads are in the proper holes. Position each transistor so its flat side corresponds to the outline of the flat on the circuit board.

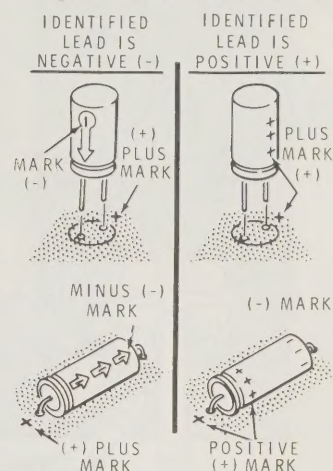


- () 2N3393 transistor (#417-118). Solder all leads and cut off the excess lead lengths.
- () 200 pF disc.
- () 200 pF disc.
- () .05 μ F disc.
- () .05 μ F disc.
- () .018 μ F Mylar.
- () Solder all leads to the foil and cut off the excess lead lengths.

CONTINUE

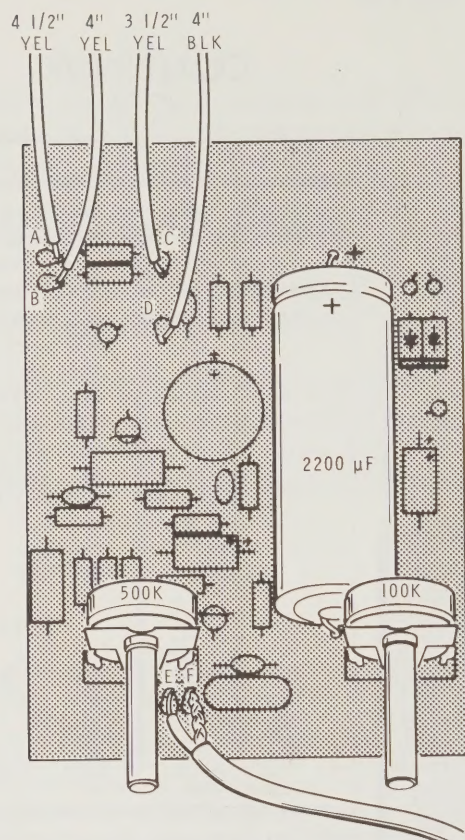
- () .05 μ F disc.

CAUTION: Before you install an electrolytic capacitor, note the polarity (+ or -) of the identified lead. Always connect the positive (+) lead to the positive (+) marked point on the circuit board.

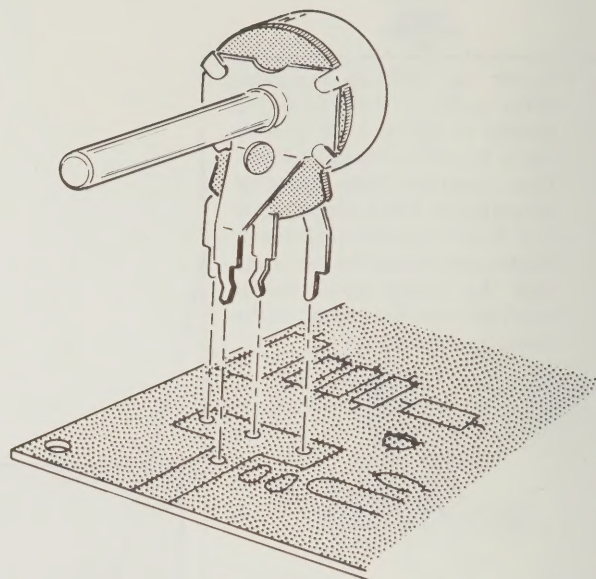


- () 1000 μ F electrolytic.
- () 10 μ F electrolytic.
- () 10 μ F electrolytic.
- () 2N3393 transistor (#417-118).
- () Solder all leads to the foil and cut off the excess lead lengths.

FINISH



PICTORIAL 3



Detail 3A

Refer to Pictorial 3 for the following steps.

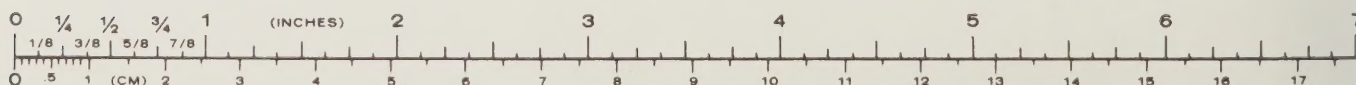
- () ☒ Locate the 500 kΩ control and position it as shown in Detail 3A. Push the lugs through their correct circuit board holes and solder them to the foil.
- () ☒ Mount the 100 kΩ control on the circuit board in the same manner.
- () Mount the 2200 µF capacitor on the circuit board. Make sure that the positive (+) lead of the capacitor is connected to the positive (+) marked hole on the circuit board. Solder the leads to the foil and cut off the excess lead lengths.

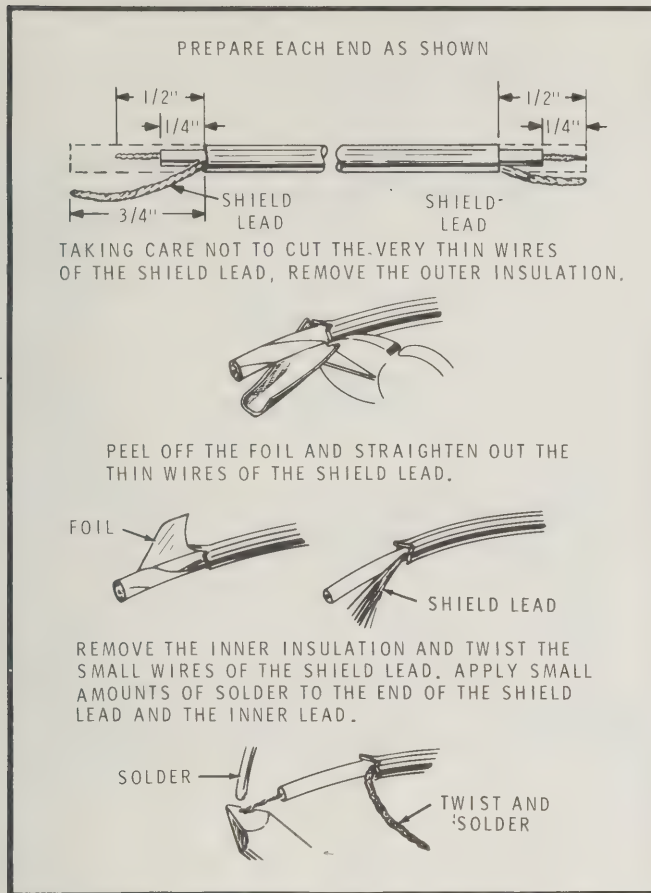
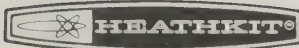
- () Prepare the following lengths of hookup wire. Cut the wire to the indicated length and remove 1/4" of insulation from each end. These wires are listed in the order in which they will be used. A scale is provided at the bottom of the page for your convenience.

| | |
|---------------|---------------|
| 4-1/2" yellow | 3-1/2" yellow |
| 4" yellow | 4" black |

Connect one end of each wire to the circuit board in the following steps.

- () ☒ 4-1/2" yellow wire to hole A (S-1).
- () ☒ 4" yellow wire to hole B (S-1).
- () ☒ 3-1/2" yellow wire to hole C (S-1).
- () ☒ 4" black wire to hole D (S-1).
- () ☒ Prepare the shielded cable as shown in Detail 3B.
- () ☒ At the short-shield end of the cable, connect the shield to hole F (S-1) and the inner lead to hole E (S-1) on the circuit board.





Detail 3B

- () Carefully inspect the foil side of the circuit board for any solder bridges between the foils. Solder any connections that might have been missed and cut off any excess lead lengths.

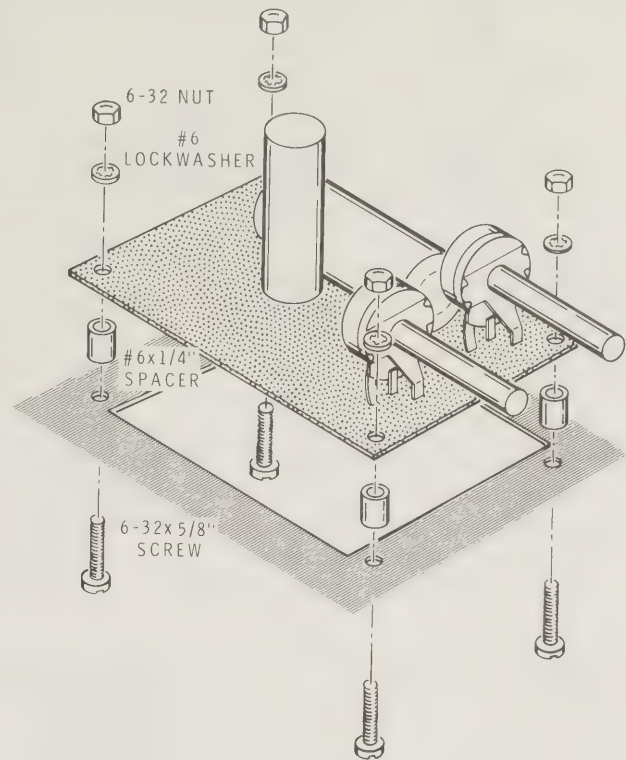
CHASSIS PARTS MOUNTING

Refer to Pictorial 4 (fold-out from Page 4) for the following steps.

NOTE: The Heath Company has provided a plastic nut starter with this kit. Use this nut starter to hold and start 6-32 and 4-40 nuts on screws.

In the following steps the circuit board will be mounted on the chassis as shown in Detail 4A.

- () Push four 6-32 x 5/8" screws through the chassis from the bottom. Set the chassis on your work bench so that it rests on the screw heads. This will hold the screws in place for the following steps.

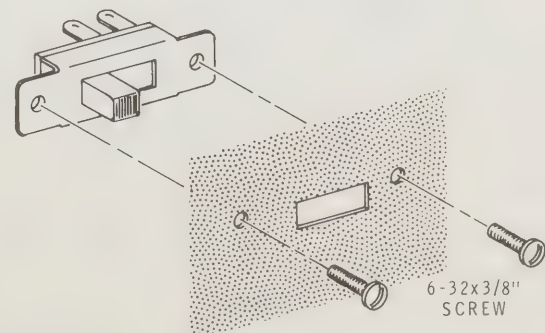


Detail 4A

- () Place four #6 x 1/4" spacers over these screws.

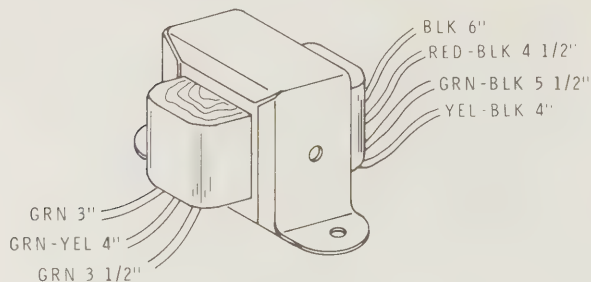
NOTE: It may be necessary to flex the front and rear panels of the chassis slightly to allow the control shafts to slide through the front panel holes.

- () Set the circuit board on the screws and fasten it with four #6 lockwashers and four 6-32 nuts.
- () Install the slide switch at AA as shown in Detail 4B. Position the switch as shown in Pictorial 4. Use 6-32 x 3/8" screws.



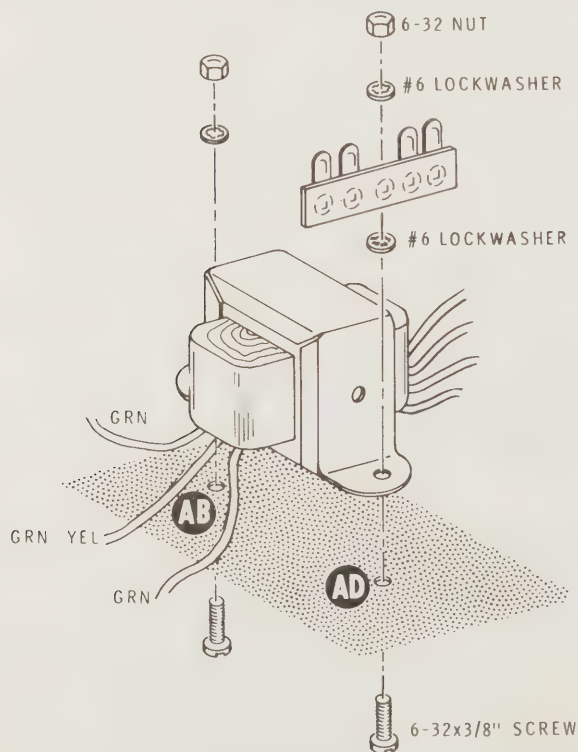
Detail 4B

MEASURE ALL LEADS FROM WHERE
THEY LEAVE THE TRANSFORMER

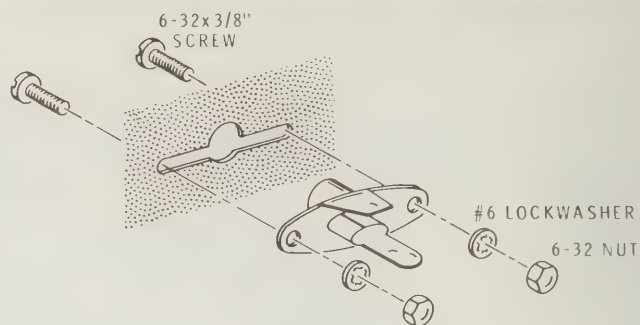


Detail 4C

- () Refer to Detail 4C and cut the power transformer leads to the indicated lengths. Remove 1/4" of insulation from each lead. Save the cut-off black lead; it will be used later.
- () Mount the power transformer as shown in Detail 4D. Use a 6-32 x 3/8" screw, a #6 lockwasher, and a 6-32 nut at AB; use a 4-lug terminal strip, a 6-32 x 3/8" screw, two #6 lockwashers, and a 6-32 nut at AD.

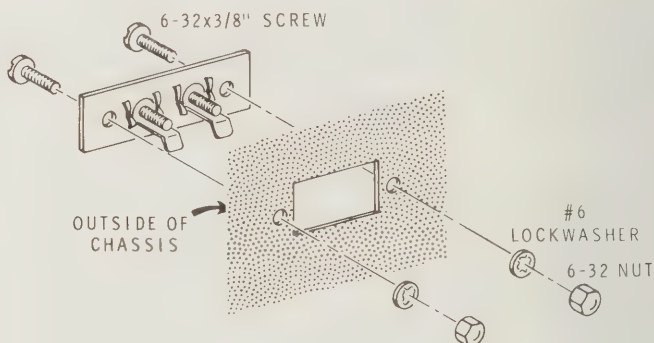


Detail 4D

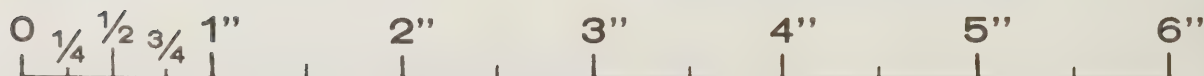


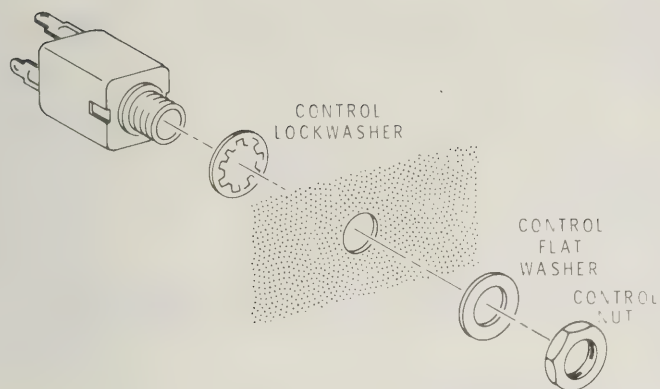
Detail 4E

- () Refer to Detail 4E and mount the phono jack at AE, with 6-32 x 3/8" screws, #6 lockwashers, and 6-32 nuts.
- () Refer to Detail 4F and install the 2-lug screw type terminal strip at AF with 6-32 x 3/8" screws, #6 lockwashers and 6-32 nuts.

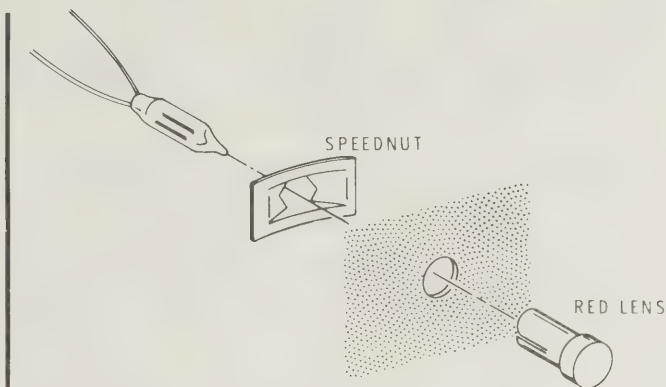


Detail 4F





Detail 4G



Detail 4H

(✓) Refer to Detail 4G and install the phone jack at AG, with a control lockwasher, a control flat washer, and a control nut. Note the position of the lugs.

(✓) Refer to Detail 4H and insert the red lens through the front of the chassis at AH. Push the speednut over the back of the lens with the concave side of the speednut toward the chassis. Then insert the neon lamp into the lens.

TRANSFORMER WIRING

Refer to Pictorial 5 for the following steps.

- (☒) Connect either green transformer lead to either hole marked GRN on the circuit board (S-1).
- (☒) Connect the remaining green transformer lead to the other hole marked GRN (S-1).
- (☐) Connect the green-yellow transformer lead to the hole marked GRN-YEL on the circuit board (S-1).

NOTE: Two sets of line voltage wiring instructions are given below, one for 120 VAC line voltage and the other for 240 VAC line voltage. In the U.S.A., 120 VAC is used, while in foreign countries, 240 VAC is more common. USE ONLY THE INSTRUCTIONS THAT AGREE WITH THE LINE VOLTAGE IN YOUR AREA.

120 Volt Wiring

Refer to Detail 5A for the following steps.

Connect the wires from the power transformer to terminal strip AD as follows:

- (☐) Black to lug 1 (NS).
- (☐) Black-green to lug 1 (NS).
- (☒) Black-yellow to lug 3 (NS).
- (☐) Black-red to lug 3 (NS).
- (☐) Locate the cut-off black transformer lead. Cut it to a length of 1-3/4". Remove 1/4" of insulation from each end.
- (☐) Connect this black lead from lug 3 of terminal strip AD (NS) to lug 1 of slide switch AA (S-1).

240 Volt Wiring

Refer to Detail 5B for the following steps.

Connect the wires from the power transformer to terminal strip AD as follows:

- (☐) Black to lug 1 (NS).
- (☐) Black-red to lug 3 (NS).
- (☐) Black-green to lug 3 (NS).
- (☐) Black-yellow to lug 1 of switch AA (S-1).

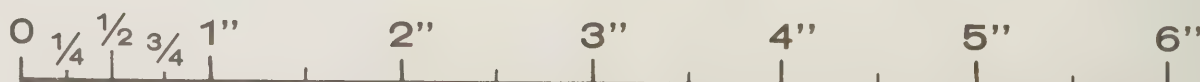
CHASSIS WIRING

Refer to Pictorial 5 for the following steps.

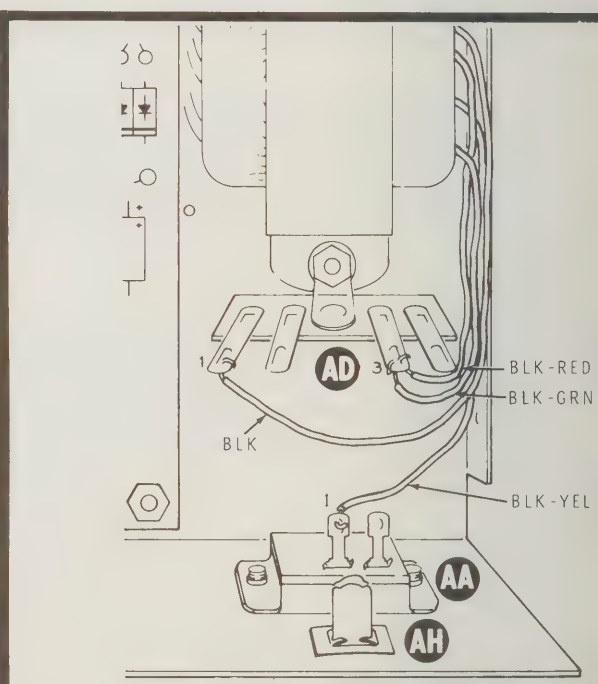
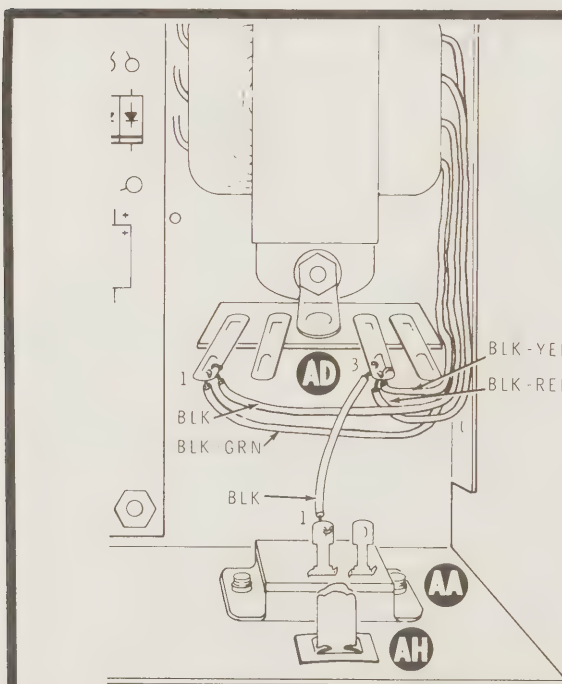
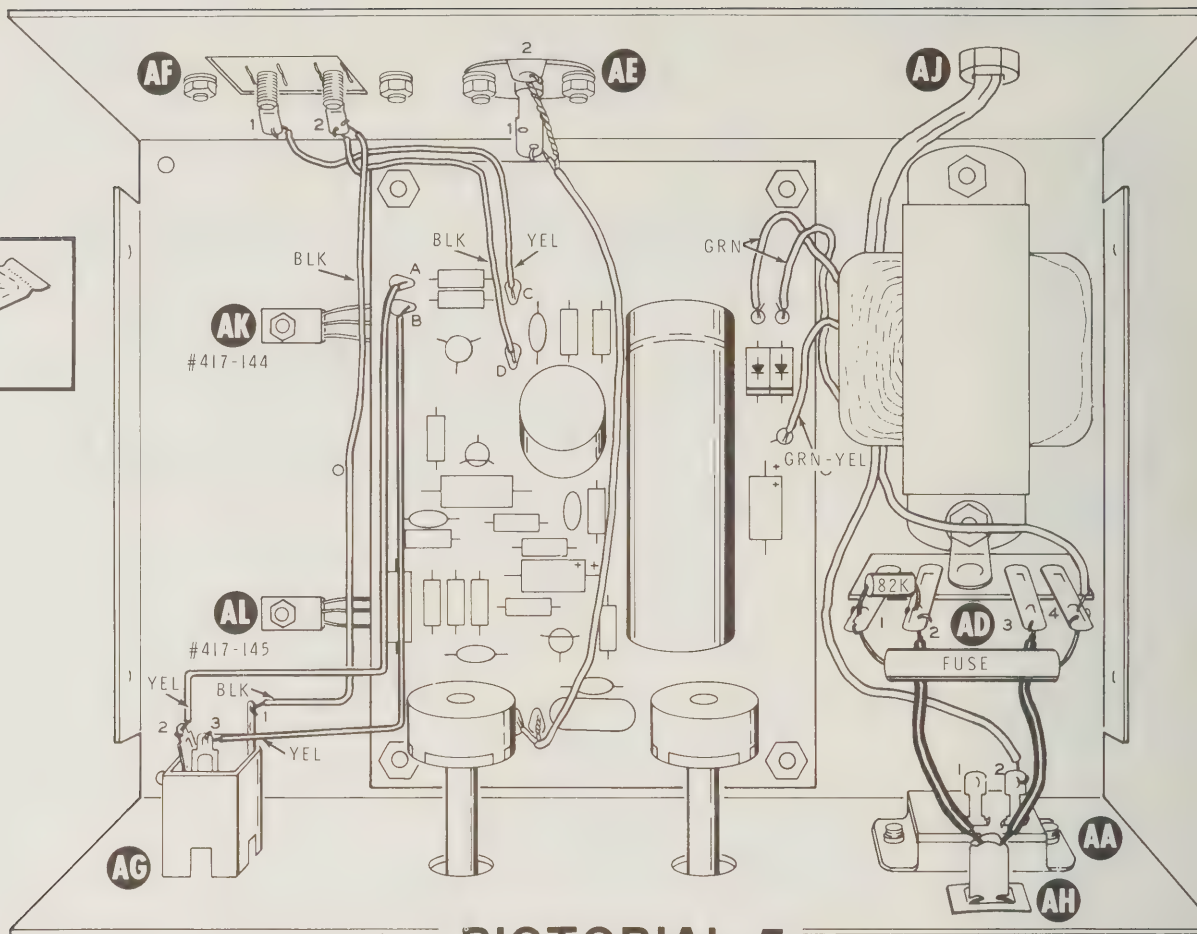
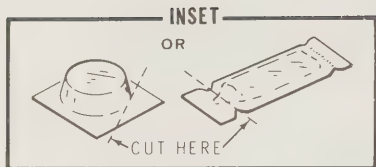
- (☐) Connect the 82 k Ω resistor (gray-red-orange) from lug 1 (NS) to lug 2 (NS) of terminal strip AD.
- (☒) Place a 1-1/2" length of black sleeving over one lead of the neon lamp and connect the lead to lug 2 of terminal strip AD (S-2).
- (☒) Place a 1-1/2" length of black sleeving over the remaining lead of the neon lamp and connect the lead to lug 3 of terminal strip AD (S-4) (S-3 for 240 VAC wiring).

NOTE: The 3/16 ampere slow-blow fuse that is supplied with the kit is the correct value for 105-125 VAC operation. If your kit is to be operated from a 210-250 VAC source, a 1/16 ampere slow-blow fuse (not supplied with this kit) should be used.

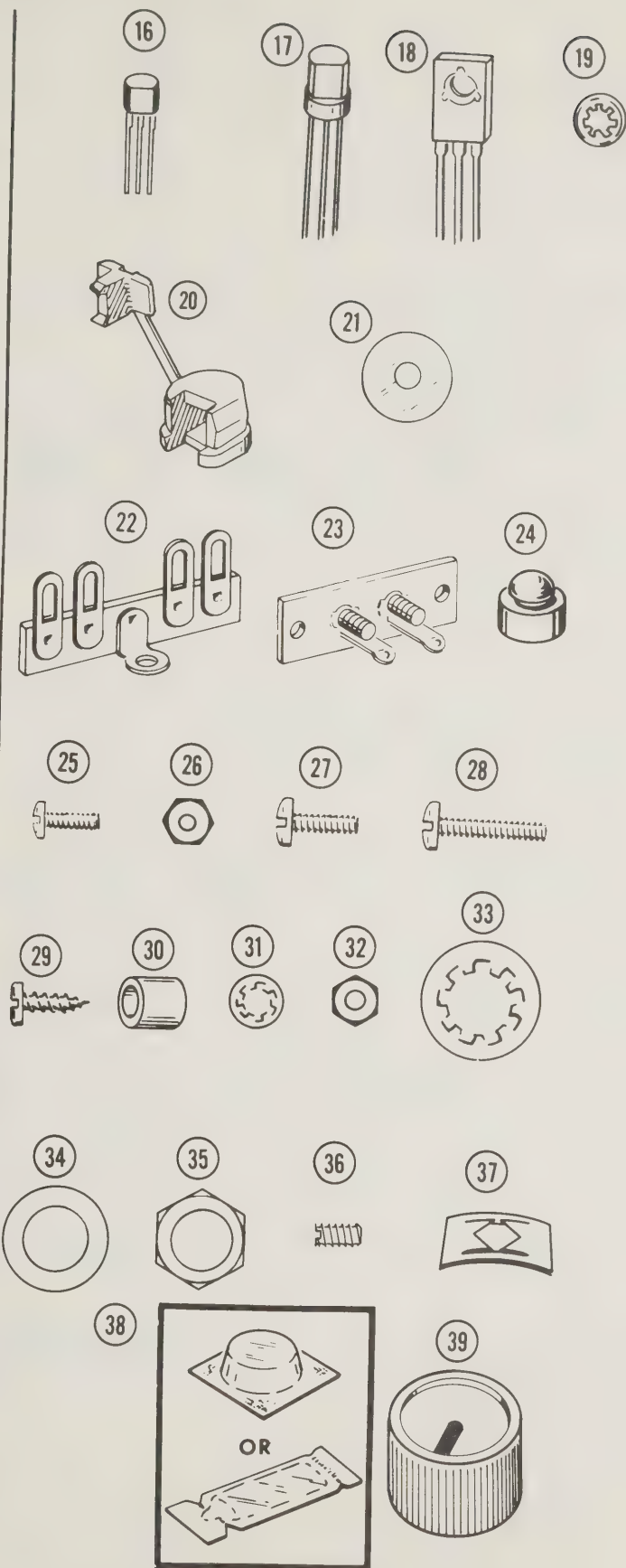
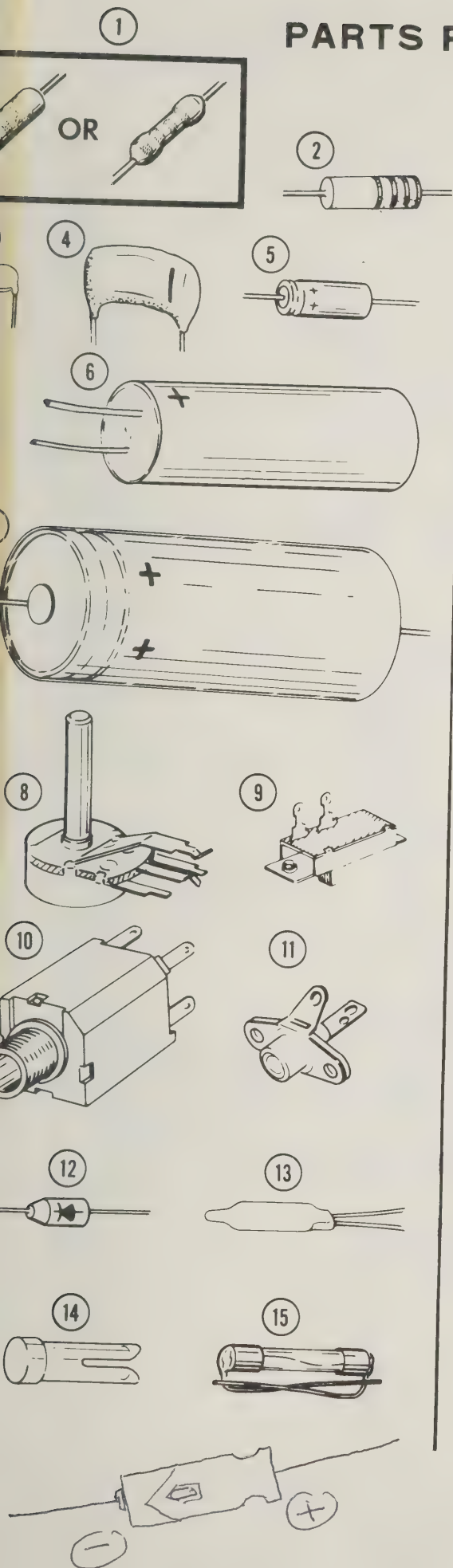
- (☐) Place a 1-1/2" length of clear sleeving over the fuse. Connect the fuse from lug 4 (NS) to lug 1 of terminal strip AD (S-4) (S-3 for 240 VAC wiring). Allow enough lead length so that the fuse stands 1/2" above the terminal strip.

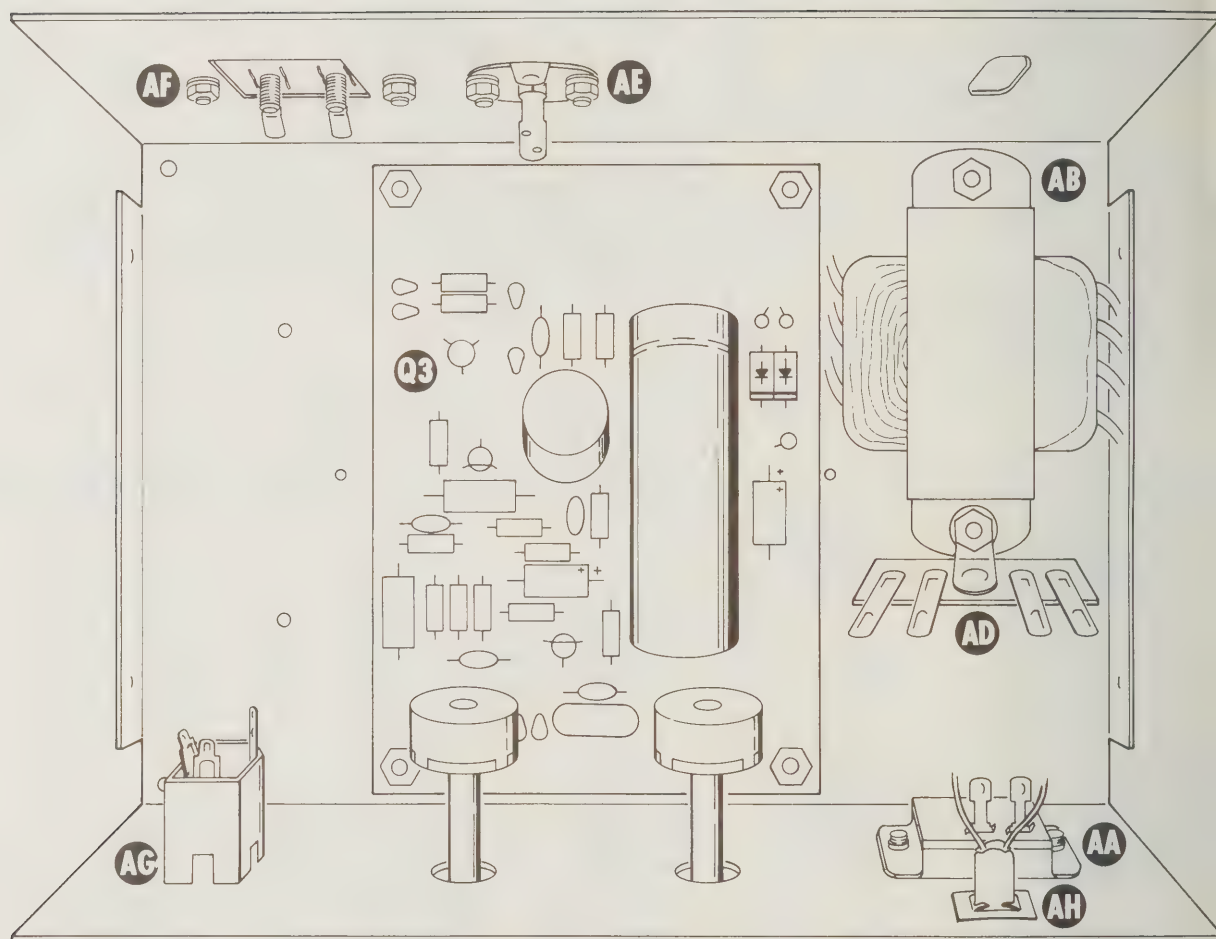


Upl

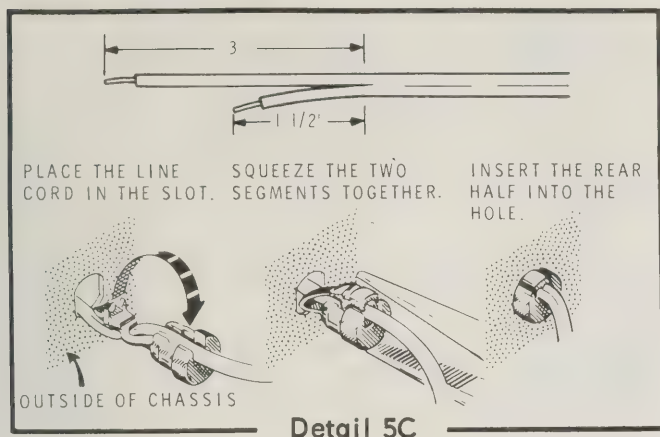


PARTS PICTORIAL





PICTORIAL 4



Detail 5C

- () Locate the line cord and prepare the leads as shown in Detail 5C. Melt a small amount of solder on the wire ends to hold the small wire strands together.
- () Insert the line cord leads through hole AJ. Connect the longer lead to lug 2 of switch AA (S-1), and the shorter lead to lug 4 of terminal strip AD (S-2).
- () Refer to Detail 5C and install the line cord strain relief in hole AJ.
- () Connect the yellow wire coming from hole C of the circuit board to lug 1 of terminal strip AF (S-1).
- () Connect the black wire coming from hole D of the circuit board to lug 2 of terminal strip AF (NS).
- () Cut a 5" length of black hookup wire and remove 1/4" of insulation from each end. Connect this wire from lug 2 of terminal strip AF (S-2) to lug 1 of phone jack AG (S-1).
- () Connect the yellow wire coming from hole B of the circuit board to lug 3 of phone jack AG (S-1).
- () Connect the yellow wire coming from hole A of the circuit board to lug 2 of phone jack AG (S-1).

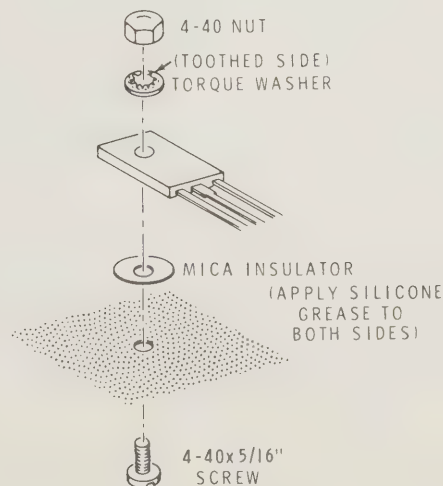
- () Connect the inner lead of the shielded cable coming from the circuit board to lug 1 of phono socket AE (S-1).
- () Connect the shield lead of the shielded cable to lug 2 of phono socket AE (S-1).

NOTE: When installing the transistors in the next two steps, be sure to position the metal side of the transistor against the mica insulator. The tooth side of the #4 torque washer must be away from the transistor. Do not overtighten the screw, as the transistor can be easily damaged.

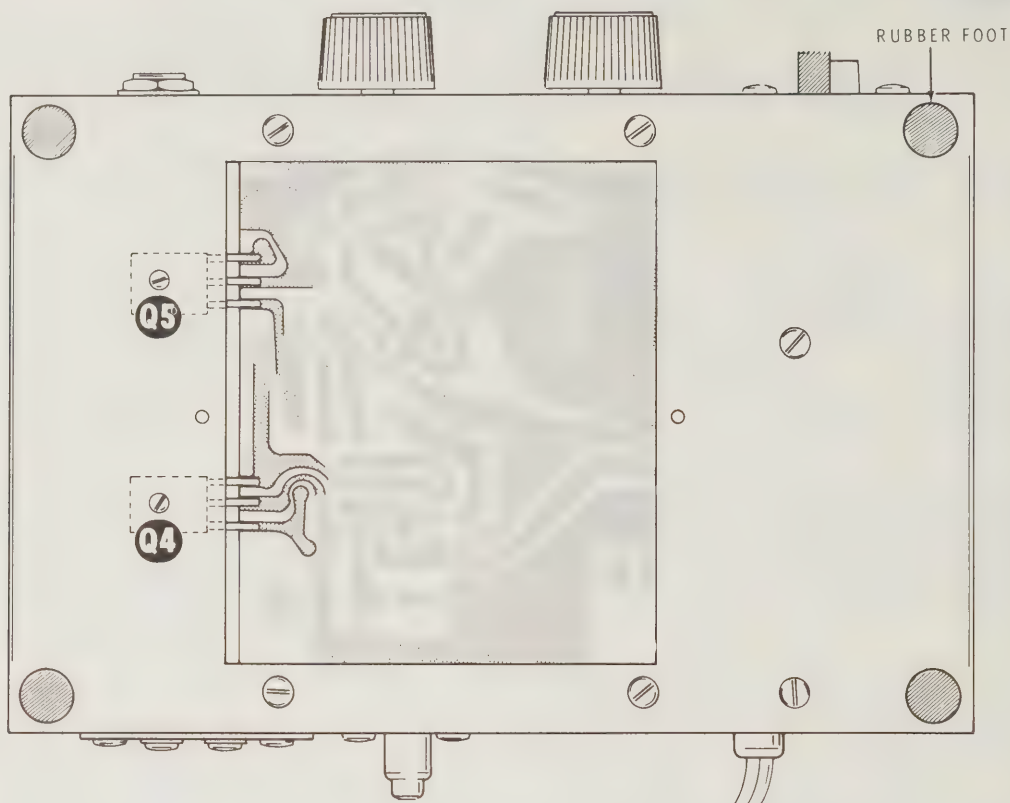
- () Locate the two mica insulators that are packed between the two pieces of cardboard. Then locate the silicone grease and apply a layer of grease on both sides of the insulators. The inset drawing on Pictorial 5 shows a good way to open the grease container.
- () Refer to Detail 5D and mount the MJE521 (#417-144) transistor at AK. Use a 4-40 x 5/16" screw, a mica insulator, a #4 torque washer, and a 4-40 nut. See Pictorial 5 (fold-out from Page 10).

Make sure the transistor leads are on the foil side of the circuit board and lined up with their respective foil. Do not bend the leads yet.

- () In the same manner, mount the MJE371 (#417-145) transistor at AL. Use a 4-40 x 5/16" screw, a mica insulator, a #4 torque washer, and a 4-40 nut.



Detail 5D

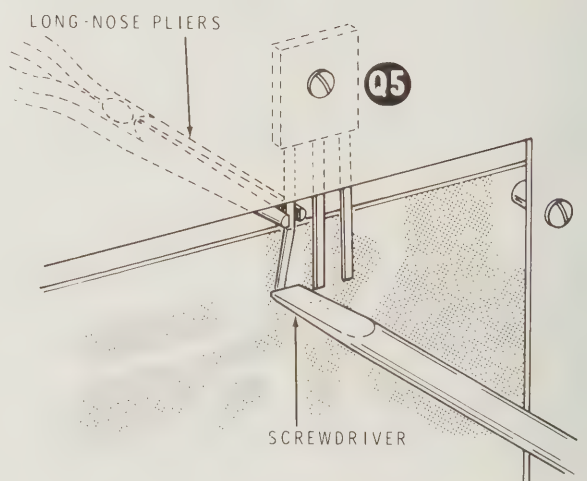


PICTORIAL 6

Refer to Pictorial 6 for the following steps.

- () Refer to Detail 6A and bend each lead of transistors Q4 and Q5 against the circuit board foil as follows: Hold the lead with a pair of long-nose pliers as shown, and then push the end of the lead against the foil with a screwdriver. Any bending of the lead where it emerges from the transistor may damage the transistor.
- () Solder the leads of transistors Q4 and Q5 to the circuit board foil.

This completes the wiring. Carefully inspect the Amplifier for any unsoldered connections or broken leads. Then turn the Amplifier over and shake out any loose bits of wire or solder that may have lodged in the wiring.



Detail 6A

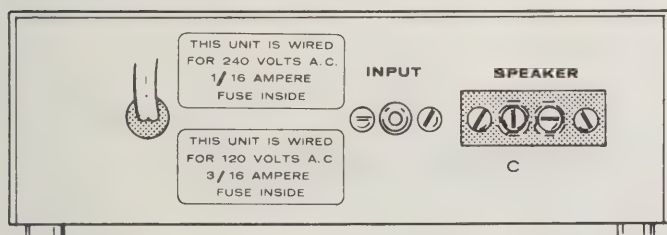
FINAL ASSEMBLY

Refer to Pictorial 6 for the following steps.

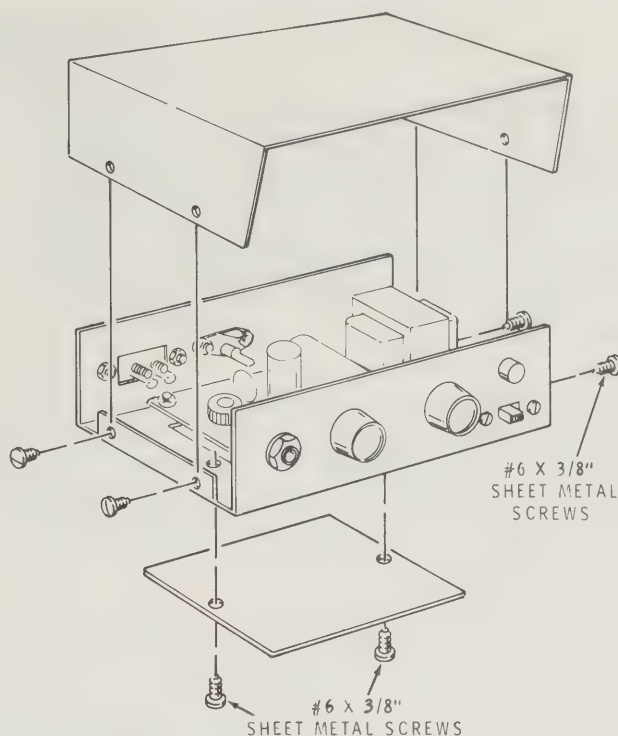
- () Install the rubber feet into the chassis bottom, by inserting the small end of each foot into the hole. Then twist and press into place.
- () Install an 8-32 x 1/4" setscrew in each of the knobs.
- () Rotate the Volume and Tone controls fully counter-clockwise. Then place a knob on each control with the knob pointer in the 7 o'clock position and tighten the setscrew.

NOTE: In the next step, the blue and white identification label will be installed on the rear of the chassis. If the Amplifier is wired for 120 volts, place the label over the 240 volt lettering. If it is wired for 240 volts, place the label over the 120 volt lettering.

- () Carefully peel away the backing paper from the blue and white identification label. Then press the label in place over the proper lettering on the rear of the chassis as shown in Detail 6B. Be sure to refer to the numbers on this label in any communications you have with the Heath Company about this kit.



Detail 6B



PICTORIAL 7

Refer to Pictorial 7 for the following steps.

- () Route the line cord and transformer leads clear of the screw holes before installing the bottom plate and chassis cover.
- () Mount the bottom plate on the chassis, using two #6 x 3/8" sheet metal screws.
- () Slide the chassis cover down on the chassis with the sloped edge to the front and mount it with four #6 x 3/8" sheet metal screws.

OPERATION

The Heathkit Model AA-18 Amplifier will operate from any 105-125, or 210-250 volt, 50/60 Hz AC power source. All controls are clearly marked and are accessible from the front. The **SPEAKER** connections and **INPUT** are clearly marked on the rear of the chassis. This Amplifier can be used with headphones, or with a 4 ohm, 8 ohm, or 16 ohm speaker.

The following procedure will help you put the Amplifier into operation. Refer to Figure 1 to become familiar with the control functions before proceeding with the steps. If the Amplifier does not operate properly, turn the **POWER** switch **OFF** and refer to the In Case Of Difficulty section of the Manual.

1. Connect a signal source to the **INPUT** jack on the rear of the Amplifier.
2. For best impedance match, use an 8 ohm speaker with this Amplifier.
3. Connect a speaker to the **SPEAKER** terminals on the rear of the chassis, or plug headphones into the **HEADPHONE** jack on the front panel.
4. Set the **VOLUME** control to its full counter-clockwise position.
5. Connect the line cord plug to an AC outlet.
6. Place the **POWER** switch in the **ON** position. The pilot lamp should light and a momentary buzz should be heard in the speaker.
7. Advance the **VOLUME** control to obtain the desired listening level.
8. Set the **TONE** control for the desired tone.

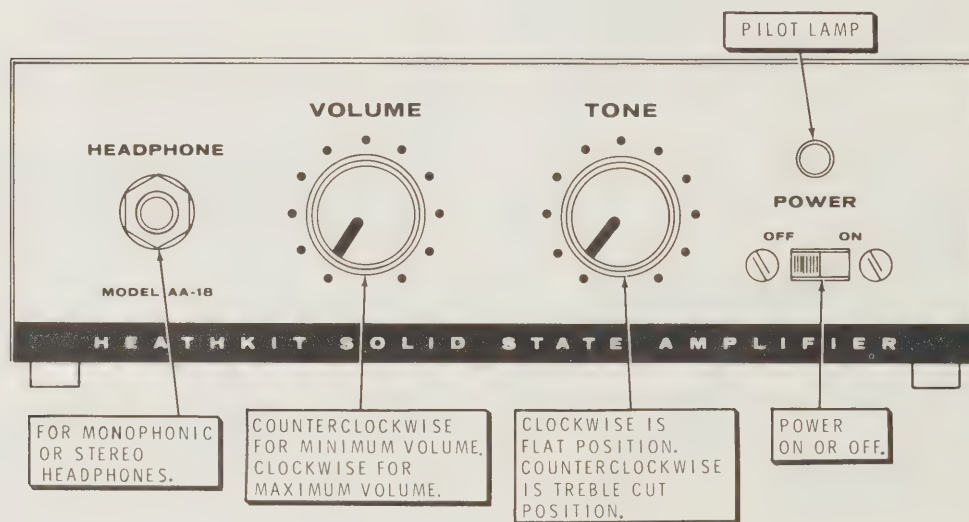


Figure 1

IN CASE OF DIFFICULTY

If the Amplifier does not operate properly after assembly, use the following information to help locate and correct the difficulty. The Troubleshooting Chart may also help you locate the problem. NOTE: When checking for the location of components, refer to the Circuit Board X-Ray View and Chassis Photograph on Page 20 and 21.

GENERAL CHECKS

1. Recheck the wiring. Trace each lead in colored pencil on the Pictorial as it is checked. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the builder.
2. About 90% of the kits that are returned for repair do not function properly due to poor connections and soldering. Therefore, many troubles can be eliminated by reheating all connections to make sure they are soldered as described in the Soldering instructions in the "Kit Builders Guide."
3. Check to be sure that all transistors are in their proper locations. Make sure that each transistor lead is connected to the proper point on the circuit board.
4. Check the values of the parts. Be sure the proper parts have been wired into each circuit as shown in the Pictorial Diagrams. It would be easy, for example, to install a 22 K Ω (red-red-orange) resistor where a 220 K Ω (red-red-yellow) resistor should have been installed.
5. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.

6. If the trouble still is not located and a voltmeter is available, check the voltage readings against those shown on the Voltage Chart on Page 21 or Schematic Diagram (fold-out from Page 23). A review of the Circuit Description may help you locate the trouble.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual. Your Warranty is inside the front cover.

TESTING PRECAUTIONS

When testing the Amplifier, make certain the speaker leads are not short circuited.

When making voltage measurements, be careful that you do not short across adjacent foils on the circuit board. For instance, if the voltmeter test probe should slip and short out a bias or supply point in the power output stage, it is almost certain to damage one or more of the transistors.

Never remove or install transistors while the Amplifier is turned on or you may damage some of the other transistors. Although transistors have almost unlimited life when they are used properly, they are much more vulnerable to damage than vacuum tubes. A vacuum tube, for instance, may be operated under shorted, zero-bias, excessive voltage, or high-current conditions for at least short periods of time without materially damaging the tube; but any one of these same conditions can completely destroy a transistor instantaneously.

Troubleshooting Chart

| DIFFICULTY | POSSIBLE CAUSE |
|---|---|
| Power switch operates backward. | 1. Switch installed improperly. |
| No sound. Pilot lamp does not light. | 1. No power at AC outlet. 2. Fuse blown. 3. Transformer primary, fuse, pilot lamp, line cord or power switch improperly wired. 4. Defective power switch. |
| Fuse blows. | 1. Defective or improperly installed diode D1 or D2. 2. Capacitor C1 shorted or installed backward. 3. Power transformer shorted. 4. Transformer wires improperly connected. |
| No sound. Pilot lamp lights. | 1. Volume is turned down. 2. No input signal to Amplifier. 3. Output is shorted. 4. Speaker is defective or wired incorrectly. 5. Faulty resistor R8, R9, R10, R11, or R12. 6. Faulty capacitor C3, C6, C7, or C8. 7. Transistor installed incorrectly. |
| Distorted sound. | 1. Volume control set too high with Amplifier operating from high-output signal source. 2. Signal from source is distorted. 3. Defective speaker. 4. Shorted coupling capacitor C6. |
| Continuous loud hum. | 1. Capacitor C6 installed backwards. |

SPECIFICATIONS

NOTE: All measurements were taken with the Amplifier operating into an 8 ohm load.

| | |
|-------------------------------------|--|
| POWER OUTPUT | 3.25 WATTS MINIMUM RMS INTO 8 OHMS AT LESS THAN 1.5% TOTAL HARMONIC DISTORTION FROM 40 TO 20,000 Hz. |
| Frequency Response. | ±3 dB from 25 Hz to 100 kHz. |
| Input Sensitivity. | 250 millivolts. |
| Input Impedance. | 125 k ohms |
| Hum And Noise. | -65 dB. |
| Treble Cut. | -22 dB at 15 kHz. |
| Harmonic Distortion. | Less than 1.5% from 40 Hz to 60 kHz at 3.25 watts output. Less than 0.7% from 20 Hz to 60 kHz at 1 watt output. |
| Intermodulation Distortion. | Less than 4% with 3.25 watts output, using 60 Hz and 6 kHz mixed 4:1. |
| Damping Factor. | 10. |
| Power Supply. | Transformer operated, full wave. |
| Fuse. | 3/16 ampere slow-blow for 120 VAC. 1/16 ampere slow-blow for 240 VAC (not supplied with kit). |
| Power Requirements. | 105-125 volts or 210-250 volts, 50/60 Hz, 5 watts maximum at full output. |
| Cabinet Size. | 7-11/16" wide x 5-9/16" deep x 2-5/8" high. |
| Net Weight. | 2 lbs. 10 oz. |

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

CIRCUIT DESCRIPTION

As you read this description, refer to the Block Diagram, Figure 2, and to the Schematic (fold-out from Page 23).

The Solid-State Amplifier circuit consists of a preamplifier, power amplifier, and a power supply. The preamplifier has Volume and Tone controls, and one input. The power amplifier has a 2-lug screw type terminal strip for speaker connections, and a headphone jack. Each section of the Amplifier circuit will be described separately.

PREAMPLIFIER

The input signal is applied directly across Volume control R1. A portion of the input signal, depending on the position of the Volume control wiper arm, is coupled through capacitor C3 to the base of transistor Q1. A voltage divider network, consisting of resistors R2, R3, and R4, provides base biasing for transistor Q1. Resistor R5 and capacitor C4 increase the input impedance of the stage by supplying positive feedback.

The amplified signal is coupled from the collector of Q1 through capacitor C6 to the base of transistor Q2. Capacitor C7 and Tone control R7 provide treble cut by allowing part of the high audio frequencies to pass to ground. Due to the low value of capacitor C7, low audio frequencies are unaffected. The setting of Tone control R7 determines the amount of treble cut.

POWER AMPLIFIER

The amplified signal from Q2 is direct-coupled to driver transistor Q3, where it is amplified and again direct-coupled to the output amplifier circuit. Because each of these stages is direct coupled, it is the bias voltage at the base of Q2 that ultimately sets the operating point for each of the following stages. This bias voltage is adjusted so the center voltage of the output amplifiers (at the emitter of Q4) is at about one-half of the supply voltage. The DC negative feedback at the emitter of Q2 stabilizes this DC output center voltage.

Output transistors Q4 and Q5 are connected in a complementary-symmetry, emitter-follower circuit. A positive-going audio signal in the base circuit of the output transistors will cause Q4 to conduct, charging capacitor C8 through the speaker voice coil. A negative-going audio signal in the base circuit of the output transistors causes Q5 to conduct, which causes capacitor C8 to discharge back through the speaker voice coil. This charging and discharging of capacitor C8 is at the same rate as the input audio signal. Resistor R15 is connected in a bootstrap circuit between the output of the amplifier and the base of Q5 to provide full AC drive to Q5 during the negative half-cycle of the audio signal.

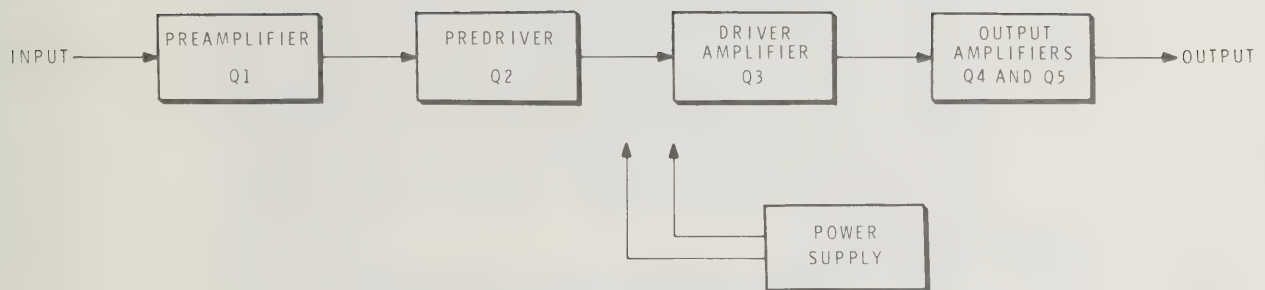
Resistors R12 and R11 are connected in a feedback loop that applies both negative DC and negative AC feedback to the emitter of Q2 to reduce distortion and stabilize amplifier operation. Capacitor C10 increases this feedback where it is needed at higher frequencies to prevent oscillations. Capacitor C9 and resistor R16 feed to ground high audio frequency signals that might otherwise cause oscillations. Resistors R17 and R18 serve as isolation resistors between the Headphones jack and the output amplifier stage.

POWER SUPPLY

The AC power from the line cord is connected through the Power switch and the fuse to the primary windings of power transformer T1. The neon pilot lamp, in series with current limiting resistor R100, is connected across the transformer primary winding. When the Power switch is in the On position, current flows through the transformer primary winding and through the pilot lamp causing it to light.

The power transformer can be wired to operate from a 105-125 volt or a 210-250 volt 50 or 60 Hz source.

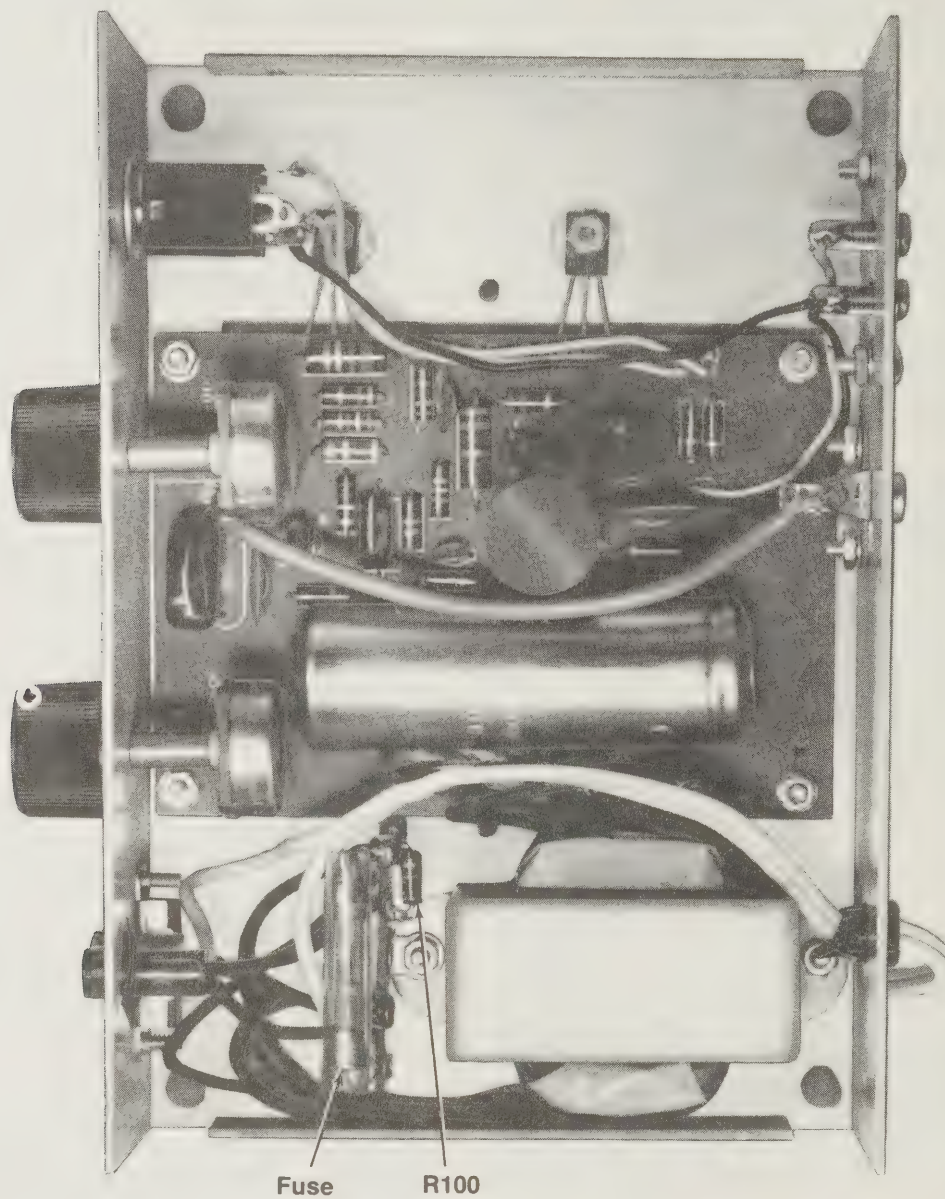
The secondary of the power transformer supplies 17.5 volts AC to a full-wave center-tapped rectifier circuit that consists of diodes D1 and D2. The output of the rectifier circuit is filtered by capacitors C1, and C2, and resistor R10.



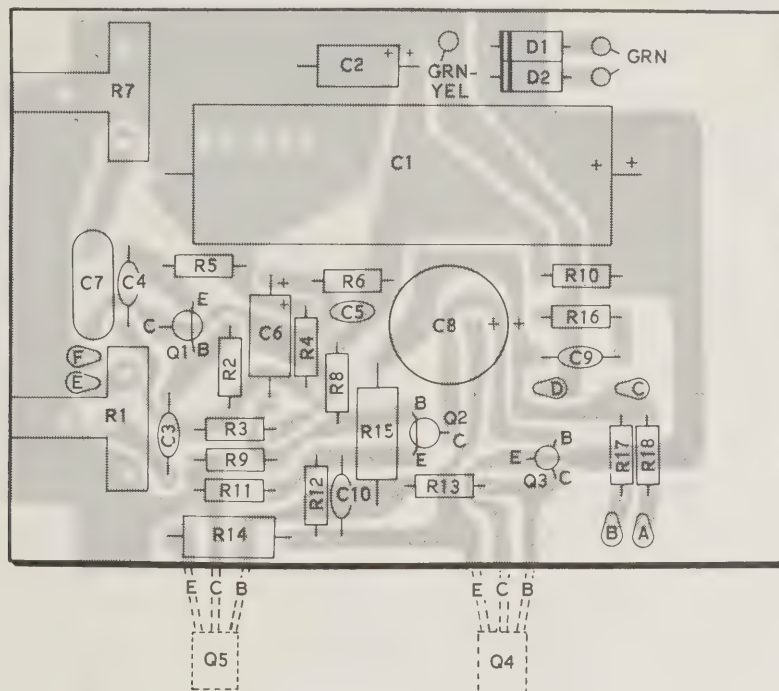
BLOCK DIAGRAM

Figure 2

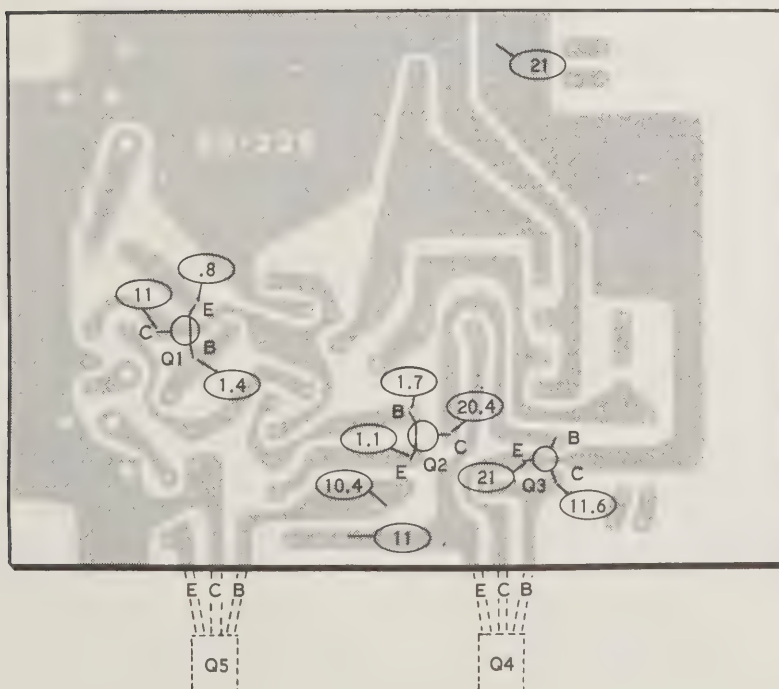
CHASSIS PHOTOGRAPH



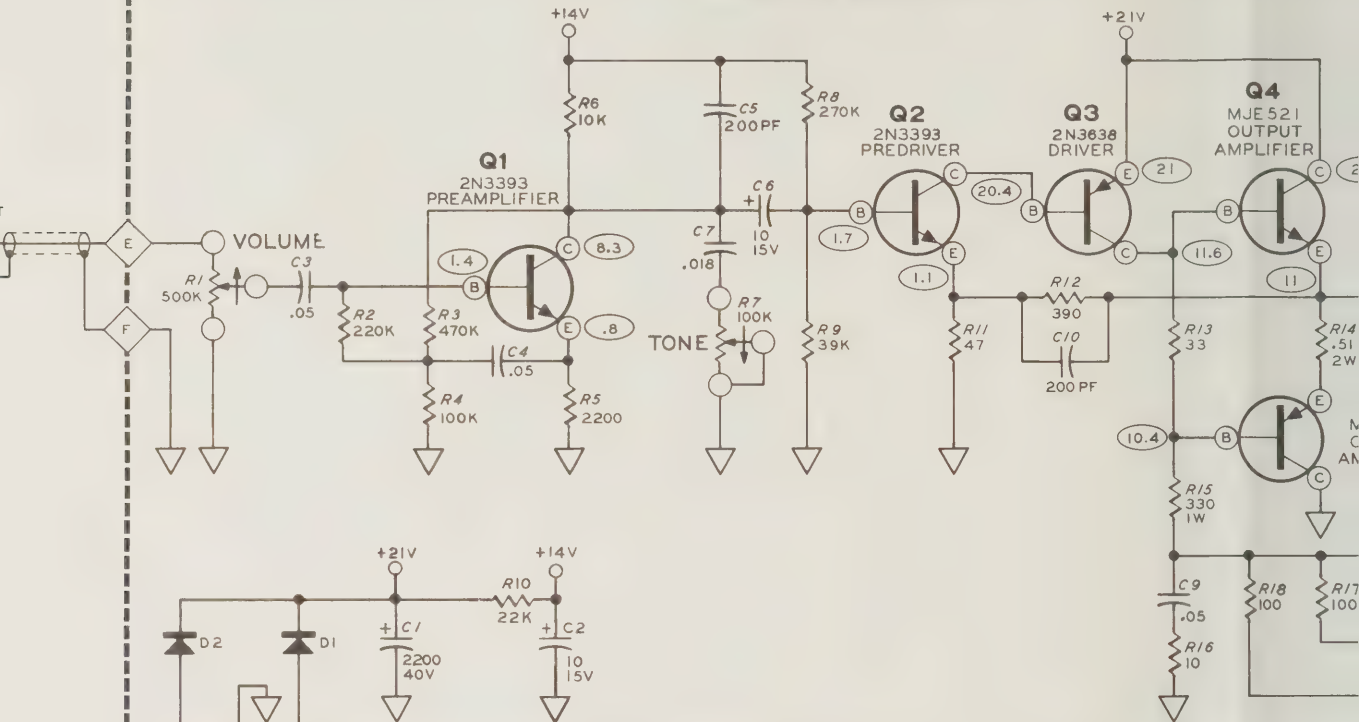
CIRCUIT BOARD X-RAY VIEW (VIEWED FROM FOIL SIDE)



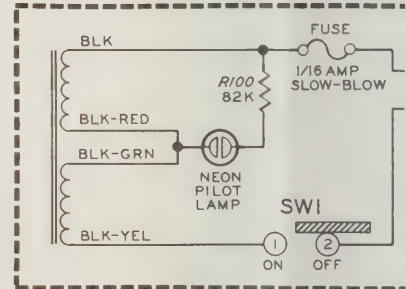
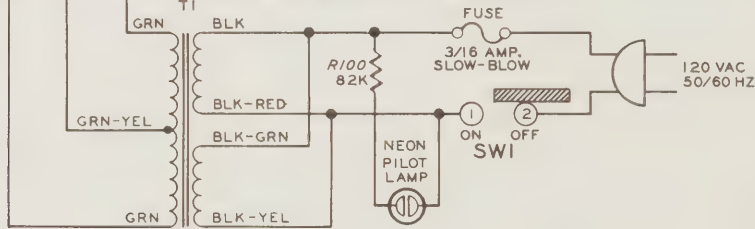
VOLTAGE CHART



AMPLIFIER SECTION



POWER SUPPLY SECTION





CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least THREE INCHES of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022



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